Federal Aviation Administration

Seat Belts and Shoulder Harnesses

Smart Protection in Small Airplanes

WE ALL ENJOY the convenience, fun and safety of flying. We also understand that there may be times when our best efforts for a safe flight will be inadequate, and an accident could happen.

While most accidents are minor and pose no significant risk to the airplane or its occupants, some can result in major injuries or fatalities. However, studies of serious accidents have shown that the proper use of shoulder harnesses, in addition to the safety belt, would reduce *major injuries by 88 percent and reduce fatalities by 20 percent*.

INSTALL SHOULDER HARNESSES IN YOUR AIRPLANE

Shoulder harnesses have been required for all seats in small airplanes manufactured since December 12, 1986. If your airplane is not equipped with them, you should obtain kits for installing shoulder harnesses from the manufacturer or the manufacturer's local sales representative.

USE THE RESTRAINT SYSTEM... PROPERLY

Federal regulations[1] require that safety belts and shoulder harnesses (when installed) be properly worn during landings and takeoffs. If the restraint is not worn properly, it cannot provide full benefits and can even cause injury in a serious impact.

Tests have shown that slack in the restraint system should be minimal. In an impact, your body keeps moving until the slack is taken out of the restraint, but then must be abruptly stopped to "catch up" with the airplane. The restraint should be adjusted as tightly as your comfort will permit to minimize potential injuries.

The safety belt should be placed low on your hipbones so that the belt loads will be taken by the strong skeleton of your body. If the safety belt is improperly positioned on your abdomen, it can cause internal injuries. If the safety belt is positioned on your thighs, rather than the hipbones, it cannot effectively limit your body's forward motion.

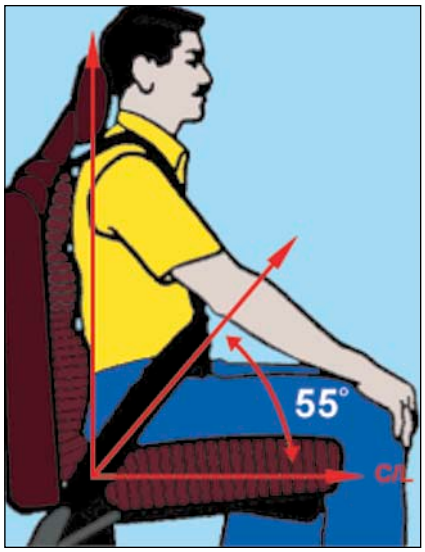
Shoulder harness systems can use dual shoulder belts or a single diagonal belt similar to those used in automobiles. The belts should not rub against your head or neck. This is uncomfortable, will discourage use of the shoulder harness, and can also cause neck injuries during an impact.

Single diagonal shoulder belts should be positioned so that the torso's center of gravity falls within the angle formed by the shoulder belt and the safety belt. Otherwise your torso may roll right out of the shoulder belt during an impact and compromise your protection.

Because the lower end of the shoulder belt is usually fastened to the safety belt buckle or the buckle insert, the safety belt buckle should be positioned on the side of your hip. This differs from the central location of the buckle that is common when only the safety belt is used.

Be sure that the safety belt is installed so that when the buckle is unlatched, both the safety belt and the shoulder belt are released. Also, be sure that the buckle can be unlatched without interference from the seat armrest, aircraft controls, or the interior wall of the airplane.

If the shoulder harness uses dual belts fastened to the safety belt near the center of your body, the shoulder belts will tend to pull the safety belt up off your hip bones. This could cause internal injuries in an impact.



When it is tightened about your hips, the safety belt should be positioned so that it makes an angle of about 55 degrees with the centerline of the airplane.

This allows it to resist the upward pull of the shoulder belts, reducing the risk of internal injury.

Otherwise, a tie-down strap from the buckle to the center-forward edge of the seat may be necessary to resist the upward pull of the shoulder belts.

If your restraint system uses a tie-down strap, adjust it to remove all the slack when the restraint system is used. A properly installed and adjusted tie-down strap is completely safe.

DON'T FORGET THE CHILDREN...

For maximum protection and safety, small children should be placed and secured in approved "child safety seat" devices during aircraft operation. Child safety seats must meet current manufacturing and identification requirements of the Federal government and be installed and secured in accordance with these regulations. Install the safety seat in a rear airplane seat, but not near an entry door or emergency exit. If you must use a front airplane seat, make sure that the child seat cannot interfere with the airplane controls or limit pilot access to the radios and flight instruments.

Install the child safety seat according to the instructions on the seat, using the airplane safety belt to secure it. Most safety seats for small infants are intended to place the infant in a rear-facing position and should be installed that way in the airplane.

Remember to consider the weight of the child and child safety seat when calculating weight and balance!

When children outgrow the safety seat, they can safely get by using only the airplane seat belt. Their small size limits the chance that they might make contact with the airplane interior during an impact. Larger children can use the shoulder harness if it doesn't rub on their face or neck when they are seated.

SUMMARY

- Seat belts alone will protect you only in minor impacts.
- Using shoulder belts in small aircraft would reduce major injuries by 88% and fatalities by 20%.
- Shoulder belt kits are now available for most airplanes.
- Proper use and installation of child safety seats, meeting Federal requirements[1], provide good protection for small children in aircraft.
- If improperly installed and used, restraints could cause injury.
- Restraint systems in small aircraft: a smart idea!

MEDICAL FACTS FOR PILOTS

Publication AM-400-90/2
(Revised May 2004)

Prepared by
Federal Aviation Administration
Civil Aerospace Medical Institute
Aerospace Medical Education Division

To order copies of this brochure and others listed below, contact
FAA Civil Aerospace Medical Institute
Shipping Clerk, AAM-400
P.O. Box 25082
Oklahoma City, OK 73125
(405) 954-4831

OTHER SAFETY BROCHURES AVAILABLE

Number	Title
AM-400-94/2	*Alcohol and Flying: A Deadly Combination*
AM-400-95/2	*Altitude Decompression Sickness*
AM-400-98/3	*Hearing and Noise in Aviation*
AM-400-97/1	*Introduction to Human Factors in Aviation*
AM-400-92/1	*Over the Counter Medications and Flying*
AM-400-98/2	*Pilot Vision*
AM-400-00/1	*Spatial Disorientation: Visual Illusions*
AM-400-01/1	*Physiological Training Courses for Civil Aviation Pilots*
AM-400-03/1	*Spatial Disorientation: Why You Shouldn't Fly By the Seat of Your Pants*
AM-400-03/2	*Deep Vein Thrombosis and Travel*

To view these pilot and passenger safety brochures, visit the Federal Aviation Administration's Web Site
www.faa.gov/pilots/safety

U.S. Department of Transportation